DOCUMENT RESUME

ED 224 935 CE 034 691

AUTHOR Worthington, Robert M.
TITLE Industrial Arts Education: Issues and Directions in the 1980s.
PUB DATE 25 Mar 82
NOTE 23p.; Presented at the American Industrial Arts Association Convention (Hartford, CT, March 25, 1982).
PUB TYPE Viewpoints (120) -- Speeches/Conference Papers (150)

EDRS PRICE MF01/PC01 Plus Postage.
DESCRIPTORS Career Development; Career Education; *Educational Planning; Educational Quality; *Futures (of Society); *Industrial Arts; Industrial Education; Secondary Education; Teacher Effectiveness; Teacher Shortage; *Vocational Education

ABSTRACT

Industrial arts education is a comprehensive education program concerned with technology; industry; students understanding of themselves, their talents, and their abilities; development of job skills; and familiarization of students with occupational clusters. As such, it is closely interrelated with vocational education and career education. A current issue in industrial arts education is the conflict of philosophy versus practice. Contemplation of technology rather than craftsmanship (handling of implements and materials of technology) is mistakenly seen as the means to achieve better quality of work. Another current issue in industrial arts is the role of career education. Career guidance is not "beneath" the purposes of industrial arts education; those in the field should guide students in making wise career choices. Emphases for the future of industrial arts education are further individualizing and improving the quality of instruction, overcoming the problems of the teacher shortage and of poor teacher quality, and solving the problem of inadequate financial resources. (YLB)

****
* Reproductions supplied by EDRS are the best that can be made *
* from the original document. *
****

ED224935

INDUSTRIAL ARTS EDUCATION: ISSUES AND DIRECTIONS IN THE 1980S

SPEECH GIVEN

BY

DR. ROBERT M. WORTHINGTON

ASSISTANT SECRETARY

FOR

VOCATIONAL AND ADULT EDUCATION

U.S. DEPARTMENT OF EDUCATION

BEFORE THE

EPSILON PI TAU INTERNATIONAL BREAKFAST

AMERICAN INDUSTRIAL ARTS ASSOCIATION

1982 CONVENTION

HARTFORD, CONNECTICUT

MARCH 25, 1982

CE 034691

U.S. DEPARTMENT OF EDUCATION
NATIONAL INSTITUTE OF EDUCATION
EDUCATIONAL RESOURCES INFORMATION CENTER (ERIC)

☑ This document has been reproduced as received from the person or organization originating it.

☐ Minor changes have been made to improve reproduction quality.

• Points of view or opinions stated in this document do not necessarily represent official NIE position or policy.

"PERMISSION TO REPRODUCE THIS MATERIAL HAS BEEN GRANTED BY

R Worthington

TO THE EDUCATIONAL RESOURCES INFORMATION CENTER (ERIC)."

INDUSTRIAL ARTS EDUCATION: ISSUES AND DIRECTIONS IN THE 1980s

DR. ROBERT M. WORTHINGTON

4-20-82

Most of those who know me fairly well associate me with the field of vocational education. Those who know me better also know that my roots are equally well embedded in the field of industrial arts. As a matter of record, I started my career as an industrial arts teacher at Johnson High School in Saint Paul, Minnesota and later served as State supervisor of industrial arts in Minnesota. During my first tenure in Federal service in 1971-73, as Associate Commissioner of the Bureau of Adult and Vocational-Technical Education, I established as one of my major efforts an attempt to draw industrial arts and vocational trade and industrial education closer together into a nexus that I considered most natural. I am convinced that this can still be of great mutual benefit to both fields of education.

More than twenty years ago, I wrote an article for School Shop magazine on industrial arts and craftsmanship. I felt at that time that we had demanded so many things of the industrial arts teacher that perhaps we should zero in on one quality -- that of craftsmanship. In that article I stated:

> "When Chaucer wrote the statement "The lyf so short, the craft so long to lerne", he must have been thinking ahead 600 years to the problem of the future industrial-arts teacher as he attempts in four short years of college training to become a craftsman, a well-rounded and liberally-educated missionary, a polished man of the world, an interpreter of industry, a designer and an expert in applied science. Most of our leaders would agree that in the complex technological society of today, the master teacher of industrial arts should fit this description."

"Industrial arts is accepted in our schools because it offers practical experience with tools and machines. The opportunity it provides to work creatively with industrial tools and materials at the level of each student's ability sets it apart from other curriculum areas. Industrial arts must concern itself with developing the basic elements of craftsmanship, because this is the most important contribution it can make to education. Our teacher education programs must emphasize excellence in craftsmanship pointed toward the technical areas, not the handicrafts. Likewise, the master teacher must upgrade his own craftsmanship in the technical area"[1]

I am proud that industrial arts was first included in a Federal Vocational Education Act, through the Education Amendments of 1972, while I was Associate Commissioner of Education. I believe that the USOE funded project, Guidelines for Industrial Arts in Career Education: Implications for Curriculum Development, made the relationship between industrial arts and vocational education more productive. I am equally proud that the final report for the Industrial Arts Standards Project, directed by William Dugger of Virginia Polytechnic Institute and State University, was delivered to our office during my second tenure in Federal service as the Assistant Secretary for Vocational and Adult Education.

I have always kept track of industrial arts and the issues that seem to confront it while working in both the private sector and in various positions in the public sector. This variety of experience has given me the opportunity, which most professionals rarely have, of viewing the whole "forest" of industrial arts education, rather than being preoccupied by single trees.

If I may, I would like to maintain this dual perspective -- of simultaneously being an "insider" and an "outsider" regarding industrial arts education -- during my address to you this morning. Perhaps I might help you to see yourselves somewhat differently regardless of your respective positions in the profession.

While my purpose this morning is not to recount the entire history of the industrial arts education movement, which by most accounts begins about a century ago, -- there are some high points I must mention which will serve as a foundation for my discussion and how they are now interpreted

by some leaders in your field. Some scholars claim that the "true" philosophy of industrial arts education had its beginnings in the social theorizing of John Dewey[2] and his conceptions of how the individual and democracy should adjust to the Industrial Revolution. Industrial arts grew out of the manual training movement of the late 1800s. A most significant contribution to its development prior to World War II was a publication of Standards of Attainment in Industrial-Arts Teaching.[3] These Standards were published by the Industrial Arts Section of the American Vocational Association in 1934. Twelve objectives were clearly spelled out. "The Standards of Attainment represented a major step forward in defining the content of the program."

Let me mention just a few of the tremendous technological developments during or immediately following World War II that changed our lives in irreversible ways. First and foremost was the harnessing, for military purposes, of nuclear energy; another was the real start of the electronics age, as military needs begat the development of miniaturized components; television, although invented earlier, became widespread and commercialized immediately after the war; and the invention of the transistor in 1948 opened up the entire field of solid-state electronics spawning entirely new technologies based on a new applied science called cybernetics. While not necessarily a technological development it is important to note that our experience just before and during World War II provided the first dramatic proof of the need for a highly skilled workforce. It was demonstrated once and for all that the growth of technology was dependent on skill training at all levels of education, both public and private.

Naturally, many educators were convinced that the philosophy, the content, the laboratories, and the instructional strategies for industrial arts education should be revised to reflect more accurately the technology of that period in our nation's history. Wilbur was one of the first to devise and publish a definition of industrial arts education that summed up these views. He defined it as -- "those phases of general education that deal with industry -- its evolution, organization, materials, occupations, processes, and products -- and with the problems resulting from the industrial and technological nature of society."[4] Wilbur was trying to anticipate the future, much as we are trying to do today.

As technology expanded at an exponential rate, it became the dominant theme in later definitions, replacing the basic concept of "industry" as the emphasis for the field. Maley recognized the need to create such a definition while still maintaining an industry base. He defined industrial arts education as,

> those phases of general education which deal with technology -- its evolution, utilization, and significance -- and with industry --its organization, materials, occupations, processes, and products -- and with the problems and benefits resulting from the technological and industrial nature of society.[5]

This definition was published in 1973, although used by Maley for many years before that date.

The most recent definition of note, which was the outcome of the Jackson's Mill Industrial Arts Curriculum Symposium in 1981, States that,

> industrial arts is a comprehensive education program concerned with technology, its evolution, utlization, and significance; with industry, its organization, personnel, systems, techniques, resources, and products; and their social/cultural impact.[6]

The reference to industrial arts as being a comprehensive education program is the main difference from Maley's definition. Others have stated, that if we broaden the term "industry" to include service occupations such as radio and t.v. repair, the allied health field, auto servicing, etc, the scope of industrial arts education becomes more global -- encompassing practically all organized economic, industrial, and servicing activity.

Federal funding, although outspent by State & local agencies, has played a significant role in the more recent history of industrial arts education. The Vocational Education Act was significantly broadended by P.L. 90-576 in 1968, allowing discretionary funds to be used for research in industrial arts education, which resulted in three nationally recognized curriculum products: (1) The World of Construction; (2) The World of Manufacturing; and (3) The American Industries Curriculum. These were some of the more noteworthy projects funded under P.L. 90-576. Although I am well aware that industrial arts education has many other purposes than what is usually termed, "pre-vocational instruction", I was always convinced that this particular objective should be specifically included in any Vocational Education Act. Soon after my designation as Associate U.S. Commissioner in 1971 I appointed an ad hoc committee to develop criteria and guidelines for funding industrial arts education under the act. These criteria and guidelines formed the basis for including industrial arts in the 1972 amendments and in the current Vocational Education Act, P.L. 94-482. These funds are included as a part of the basic grant allocated to each State which are used at the discretion of each State Board. It should also be stressed that industrial arts education may be funded under several sections of the Act, particularly the section dealing with guidance and

counseling. I would like to remind all of you and the entire profession that each State Board must be convinced on the need and importance to include industrial arts in the State plan for vocational education in order to participate in Federal funding.

According to our latest figures, which are for program year 1979-80, roughly $3,500,000 of Federal funds were expended by the States for industrial arts education. These funds involved only 1,800,000 students out of a possible total of 8,000,000 industrial arts students.

Another development at the Federal level during the 1970s was career education. While there is no doubt that this concept was too global and which invited numerous interpretations as well as misinterpretations -- it may well contain some educational lessons for industrial arts education. Actually, career education was never a <u>new</u> concept for industrial arts education. It's history and practice emphasized helping students to better understand themselves, their talents, and their abilities; and to aid them in developing the competencies needed in a highly industrialized and technological society. Still another important purpose of industrial arts education, familiarizing students with major occupational clusters so as to facilitate wise career choices, is also a central theme in career education.

The first two stages of career education -- awareness and exploration --are clearly synonymous with the major goals and objectives of industrial arts education and in each case, it is clear that <u>all</u> students need and will benefit from these experiences. Significantly, however, career education proposed to combine these experiences with academic instruction, an emphasis

that I feel is too frequently lacking in industrial arts education. The State of Maryland, in one of its publications, has an excellent statement explaining the unique role of industrial arts in career education. It states that,

> Industrial Arts derives its content from industry and technology. The laboratories consist of tools, machines, and products of industry and technology. However, more fundamental and potentially more useful to the goal of career education is the fact that the nature of the laboratory and the range of opportunities for educational experiences permit a realistic involvement with the elements of an industrial-technological society in ways that promote maximum understanding as well as a high level of societal exploration. The laboratory permits the actual carrying out of life-like and concrete experiences typical of those in the world outside of the school. Industrial Arts programs also make extensive use of the local and expanded community as the sources of answers and information about the study of industry and technology.[7]

The purpose of the project we funded in 1973, "The Development of Guidelines for Industrial Arts in Career Education, Implications for Curriculum Development", which was co-chaired by the late Dr. Rutherford (Rudy) Lockette of the University of Pittsburgh, representing the Industrial Arts Division of the American Vocational Association and, Dr. Frederick Kagy of the Illinois State University at Normal, and president at that time of the American Industrial Arts Association, was to define and promote many of these interrelationships among industrial arts education, career education, and vocational education. As valuable as I thought this project was, I think that the momentum it created was to some degree dissipated because the profession did not work diligently enough at implementing and sustaining it. This follow-up effort of career education should definitely be on our agenda for the immediate future, together with the implementation of the current standards project.

This brief history brings me to one of the issues I would like to discuss with you this morning. It is known by several names, but it boils down to the age old conflict of philosophy versus practice. On reviewing much of the current literature, I was pained to find leaders in the field using words or phrases such as stagnation, dissonance, mass confusion, not future-oriented and, not the least, who are we? My first clue to this negativism lay in a brief article that reviewed the history of industrial arts education much as I just did, but with a definite slant or bias. The author, well credentialed by the way, clearly was a "futurist" and felt that some comprehensive, and presently undefined, study of technology and its implications is the only pure form of industrial arts, provided that the technology was far enough in the future. In his view, everything that had happened to industrial arts; the need of some to learn manipulative skills, or the need to train defense workers during World Wars I and II, was an unfortunate departure from the "true path", and perhaps viewed as a "fall from grace" or something to be ashamed of on the part of practitioners. I found this same theme repeated over and over.

From my vantage point of looking at the totality of industrial arts I see a field which is and has always been adaptable to the differing needs of individual students of all ages. I also see a field that has been salable to the community at large, and, as is becoming most important, salable to business and industry as an integral part of the delivery system for a skilled workforce. As is the case for much of education, we cannot sit on the laurels of the past but neither should we allow a few theory oriented "gloom and doom" writers give industrial arts a mass inferiority complex.

Let's turn our attention for a minute to those poor maligned lathe-turned table lamps and hammered copper plaques. Is the ability to turn out simple work like this really just a nostalgic excursion back into the nineteenth century? I think not, for most students who have never had the opportunity to use tools and machines to manipulate the environment these activities represent a tremendous accomplishment. This doesn't mean that I think these or similiar projects should be continued all through high school and college.

And what about learning the meaning of craftsmanship? Who knows what might be the ripple effects of learning the craftsman's techniques, the craftsman's dedication to detail, the tools and machines that can achieve that detail and especially the craftsman's satisfaction and pride in a job well done? The lack of these elements of craftsmanship has been cited many times for the poor quality of some of our manufactured goods. Yes, I believe that craftsmanship and quality of work is important to our nation in the years ahead and industrial arts can be a vital cog in the effort for better quality control. It seems that some of your peers evidently believe that this excellence can be achieved through esoteric contemplation of technology, rather than through handling the implements and materials of technology.

I would like to mention a close friend of mine who is just slightly younger than I. He has advanced degrees and is proud of his record of accomplishments in the field of education. In his office he displays (and often points out to visitors) a pump-lamp that he made in sixth grade industrial arts. It is contructed of birdseye maple, all componenets fit precisely and

is a real quality product which works perfectly. This friend now "manufactures" complex analyses, position papers, legislation, and other idea and word products. His materials are carefully selected, his techniques fit the problem and work beautifully, and he takes great pride in his quality products. The ultimate compliment you can pay him is to tell him he is a craftsman. Although this may be a simplistic analogy I like to believe that the quality and craftsmanship of his present products are all tied in, somehow, with that pump lamp in his office.

Recently, I have also read articles implying that the guidance function of career education is somehow "beneath" the grander purposes of industrial arts education. I simply cannot agree with this view because the human costs of hit or miss career choices are astronomical and well documented. How often do our fellow citizens wander into the wrong line of work merely from the lack of knowing about alternatives at an early age? How easily we let the economists dominate us with their "structural unemployment" and "underemployment," while no one tallies the cost of under-performance through mis-employment. Is an activity which can help alleviate this problem really second class?

With this background what are some of the directions for industrial arts for the remainder of 1980's. It has been suggested that the field needs a single philosophy encompassing all activities, yet flexible enough to permit each teacher to develop his or her own instructional program.

I believe you already have that philosophy or at least the only one I can think of that meets these requirements. This philosophical "key"

appeared in a letter from Ken Starkweather to Bill Dennis, a member of my staff, whom most of you know. Ken had sent Bill some recent testimony and ended his note with the sentence, "feel free to use it in your work in any way that will help students get a better education." As far as I am concerned, industrial arts education's philosophy is as simply stated as that -- and should be what it always has been -- to help every student get a better education, using whatever means and materials that are appropriate for each student.

This means that the emphasis for the future -- far from the restricting of industrial arts education to some lock-step theory, no matter how sophisticated -- must be on further individualizing instruction and on improving the quality of that instruction. Everything you are doing can be valuable if it is placed in the right context, for the right student, and is of sufficiently high quality. While I do not have the answers as to methods for accomplishing these goals, I suggest that the procedure involves identifying your purposes and working at program improvement. In the meantime use student diagnostic techniques as effectively as possible.

Another issue I would like to discuss is the quantity and quality of industrial arts teachers. The shortage of industrial arts teachers, about 1,500 at the beginning of the 1980-81 school year, is already well documented. While it may be of small consolation, industrial arts education is not alone in facing a shortage of teachers. Within the past few months, many newspaper and journal articles have appeared concerning the critical shortage of teachers in the mathematics and science fields. It is obvious that these shortages occur in those disciplines which have the greatest

potential for employment in technical and related fields. It has been estimated that only 15 to 20 percent of the graduates from the industrial arts teacher training institutions are entering education. Some institutions offer a dual program and in at least one institution, Eastern Kentucky University, only 15% of the students are choosing industrial teacher education while 85% choose the industrial technology option. In this respect we became our own worst enemy and Ralph Whalen cautions that, if we lose industrial teacher education as a profession, it would be a national tragedy. At this very conference we learned that one teacher training institution is already slated for extinction.

I realize that the monetary rewards are much greater for those who are entering industry from the non-teaching curriculum, but future teacher prospects should be made aware of the intrinsic rewards associated with the teaching of young people. Again I would like to quote Ralph Whalen who was my undergraduate advisor, about these values. He said recently: "looking back on my career as a teacher, I would not exchange it for anything in the world. The values to a human being (teacher) from teaching are immeasurable." Who is conveying this type of message to our high school graduates?

There seems to be several factors to blame for this difficult condition in which there is a shortage of industrial arts teachers while the total educational profession has an over supply of teachers. Reports of this situation in the media leaves the impression in the minds of parents and students that the entire profession is over-supplied. Perhaps, the industrial arts profession itself is partly to blame because of the lack of a comprehen-

sive public information campaign and naturally this results in very few recruits for the teaching profession. We should be aware of the phenomenon that when a school system closes a program or even a particular course it very seldom is re-installed as an offering.

I would like to present to you the following directions that the profession might take to overcome the problem of the teacher shortage:

1. Since many school systems cannot "afford" a full-time teacher to cover one or two classes I suggest that retired teachers be recruited to teach part-time. In any event don't allow those classes to be dropped from the curriculum. Retired teachers are an invaluable resource pool.

2. Recruit more women into the field, an avenue that may be the most promising of all.

3. Work with business and industry to develop new types of cooperative sharing programs. Many industries would probably "loan" an employee for one class.

4. Recruit teachers experienced in other fields whose future careers might be jeopardized because of over-supply. Of course these teachers would need to acquire the necessary college credits in industrial arts, but we must plan for the future also.

5. Stress the further development of the American Industrial Arts Student Association which could prove to be a valuable source of both teachers and future leaders.

6. The profession should develop a comprehensive public information campaign involving all agencies, associations, media, and which would be geared to the general public as well as to secondary students and teachers.

7. Work with those agencies of industry who are responsible for finding employment for employees who have been caught in the current economic downturn for possible industrial arts teachers.

As far as teacher quality is concerned we must consider the experienced teacher as well as the teacher training programs. Findings from the industrial arts standards project found that instruction and emphasis have not changed much since the early 1960's.[8] This implies to me that possibly the teacher education institutions have not been doing a very good job or that teachers have not been keeping abreast of the state of their art, or perhaps both. This is not a new topic or concern with me, its a problem I have wrestled with for a long time.

It is evident to me that the teacher education institutions will have to change, teachers can no longer be trained under one system and then be expected to change significantly when they begin teaching in the public schools. The curriculae at the teacher education institutions simply does not reflect the technology of today. The profession itself must

begin reviewing and evaluating the teacher education programs and to take the necessary steps for improvement. We probably need a "standards" project for the teacher education programs.

Immediate attention must also be given to updating the knowledge and skills of the older experienced teacher. This is the area in which State and/or local leadership can best serve the profession. Two closely related steps come to mind in upgrading teachers: first, the offering of stronger in-service training programs which are indicative of the technologies of today. Provide teachers with actual hands-on experiences whenever possible, and second, converting existing research and development products into formats or instruments more easily used by the teachers. This raises another need that we at the Federal level must address in concert with you, this is the development and implementation of a strong, computer-based communications network that can operate on a real-time basis much as modern medical diagnostic networks do.

Another problem faced by industrial arts, as with all of education, is the problem of inadequate financial resources. I realize that this is a real problem, but it should also be a challenge to our ingenuity. For your information I can announce that our reauthorization proposal for the expiring Vocational Education of 1963 continues to make Vocational Education Act funds available to industrial arts education. Although it is impossible to predict what congress will do with the reauthorization proposal, it is not too early to begin planning how these funds might be used f[illegible]tive problem-solving approaches such as we have been discussing.

There are other alternatives that have occurred to me that may help alleviate the financial burden being placed on industrial arts. Some of these alternatives are:

- The future will see much greater dependence on the private sector. Numerous industrial arts programs hold considerable promise for firms that need to be assured of dependable pipelines into the future work force. It is possible that financial support may be obtained from some, but trade-offs of personnel, equipment, and expertise may prove even more promising.

- The joint-use-of-resources approach can be expanded into other areas. All organizations and disciplines involved in technology -- business and industry, science and engineering education, vocational-technical education, and industrial arts education -- face overlapping problems. They all have finite resources which, viewed as a whole, are not only used inefficiently but often compete with one another. Clearly, these organizations must be brought together to negotiate how their respective problems can be solved using creative, collaborative mechanisms. Both program improvement and system economies can be achieved.

- More imaginative use must be made of volunteers. No one knows to what degree this can help, but a presidential task force is working very seriously on this approach. It stands to reason that many retired persons, including retired industrial art teachers,

would be more than willing to teach, on a part-time basis, in industrial arts education.

- And, the community, through advisory committees, -- must be more closely involved in educational program development, beginning with the early planning stages. As you are well aware, we are entering a period of intense competition for public resources. There is no better way to acquire public support than to give as many private citizens as possible a personal stake in the educational process.

Before, concluding my remarks, I know you are interested in what the Federal Office of Vocational and Adult Education plans to do on behalf of industrial arts.

FIRST, we are committed to assist you, in any way possible, to achieve effective implementation of the Industrial Arts Standards Project. The exact form of that assistance has not been decided, but we will be discussing your needs with leaders in the field.

SECOND, Although we face hiring and promotion freezes in the Department of Education, we will take all the necessary steps available to secure a full-time specialist in industrial arts education. Part-time assistance simply will not do the job.

THIRD, we are looking closely at the possibility of creating a computerized clearinghouse for program improvement in the Office of Vocational

Adult Education. This capability would in no way be another ERIC, but would immediately diagnose practical problems submitted by the field and deliver suggested practical solutions that have been tested and proven elsewhere under similar circumstances. Industrial arts education will certainly be included in this network.

I should interject, at this point, that I am enthusiastic about Secretary Terrel Bell's proposal to convert the Department of Education into a Foundation for Educational Assistance. The kind of technical assistance I have been discussing would be the primary purpose of this Foundation, rather than being a minor function occasionally offered by whatever staff-time was left from compliance and monitoring activities.

If I leave you with no other message, this morning, I want you to understand how promising the furture of industrial arts appears "from the outside." You are far better off than some of the contributors to the literature evidently believe you to be. Recently, we reviewed the joint position paper on the reauthorization of the Vocational Education Act issued by AIAA and the Industrial Arts Division of the AVA. Not only did we welcome this input, but I was impressed by its arguments concerning how industrial arts can contribute to the economic revitalization of this nation. It states, that the development of a skilled workforce depends on much more than skill training itself, and it is industrial arts education that can lay that groundwork.[9]

In past speeches, I have told vocational educators that their discipline can become the core element in the preparation of a national skilled workforce. I have also told community college educators that, with the increasing emphasis on high technology, they can, through vocational-technical education, be a key element in re-establishing this nation's competitiveness. I also believe that industrial arts education can be the key unifying element in restructuring all of education for the technological era. My staff and I will be proud to work with you toward achieving that goal.

REFERENCES

[1]Worthington, Robert M., "Craftsmanship: The Bedrock of Productivity" School Shop Magazine, Ann Arbor, Michigan, October 1963.

[2]Dewey, John and Dewey, Evelyn, Schools of Tomorrow, New York: E.P. Dutton & Company, 1915.

[3]Roberts, William E., Standards of Attainment in Industrial-Arts Teaching. Industrial Arts Section of the American Vocational Association, 1010 Vermont Avenue, N.W., Washington, D.C., 1934

[4]Wilbur, Gordon O. Industrial Arts in General Education, 1st ed., Scranton, Pa., International Textbook, 1948.

[5]Maley, Donald, The Maryland Plan, New York: Bruce, 1973.

[6]Haley, James A. and Synder, James F., "Jackson's Mill Industrial Arts Curriculum Theory: A Base for Curriculum Derivation," Man Society Technology, 1982, 41(5)6-10.

[7]"Career Education Through Industrial Arts," A pamphlet developed by the Maryland State Department of Education, 1972, p. 11.

[8]Dugger, William E., Project Director "Standards for Industrial Arts Project." Blacksburg, Virginia, Polytechnic Institute fo State University, 1980.

[9]"Industrial Arts in Vocational Education, Its Purposes, Roles and Responsibilities," Position Statements for the 1982 Reauthorization of The Vocational Education Legislation, Prepared by: American Industrial Arts Association & Industrial Arts Division of the AVA, 1981.

Israel, Everrett N., "Stagnation in Industrial Arts, Part1", Man Society Technology, 1981, 40(4) 5.5.